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TITLE OF THE INVENTION

EAR CLIP SPEAKERS THAT INTERLOCK AND ENABLE CORD SPOOLING

BACKGROUND OF THE INVENTION

Field of the Invention

5 The invention relates to ear clip speakers that interlock with each other. Audio cords of the speakers may be spooled about the location where the speakers interlock.

Discussion of Related Art

Conventional ear clip speakers are distributed to passengers on commercial aircraft to enable the passengers access to audio ports in the arm rests of their seats for listening  
10 to the aircraft internal audio playback system.

The present inventors have observed that the two speakers in a pair of ear clip speakers do not need to be separate from each other when not in use, such as during

periods of storage. Further, there is no need to all the audio cords of the speakers to freely dangle when the pair of ear clip speakers are not in use.

It is therefore desired to modify conventional ear clip speakers so as to enable the speakers to no longer remain separate from each other when not in use and to enable their audio cords to no longer dangle freely when the speakers are not in use.

#### BRIEF SUMMARY OF THE INVENTION

One aspect of the invention resides in a pair of ear clip speakers each with a speaker housing that has a spring biased fastener and a fixed fastener. When the fasteners of one of the speakers are brought into engagement and alignment with the fasteners of the other of the speakers, further manual pressing results in retraction of two of the fasteners in opposite directions. With the two of the fasteners retracted, twisting the speakers relative to each other by rotation in one direction causes another two of the fasteners to overlap and locks the speakers together at a junction where the two fasteners overlap. If the two fasteners that retract are spring biased, the spring bias from each is in opposite directions that tend to keep the fixed fasteners overlapped until untwisted by manual force. By twisting the speakers to rotate in a reverse direction, the speakers become unlocked from each other to enable the springs to spring bias the speakers apart from each other and out of engagement.

Each housing may have a convex face whose contour is partially defined by an outermost surface of the associated ones of the fasteners while the speakers are in an unlocked condition. Each housing has an opposite side that is padded and is of a

dimension greater than that of the junction about which the audio cord is spooled or wrapped when the speakers are locked.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

For a better understanding of the present invention, reference is made to the following description and accompanying drawings, while the scope of the invention is set forth in the appended claims.

Fig. 1 shows a perspective view of a pair of right and left ear clip speakers that interlock in accordance with the invention.

Figs. 2-5 show progressive side views of the pair of the right and left ear clip speakers that interlock of Fig. 1, in which Fig. 2 shows contact between the convex faces, Fig. 3 shows engagement of the convex faces, Fig. 4 shows interlocking of the convex faces after relative turning, and Fig. 5 shows the audio cord of the right and left ear clip speakers spooled.

Fig. 6 shows a schematic perspective view of a left ear clip speaker of Figs. 1-5 after engagement with the right speaker, showing a spring biased fastener pressed in against spring bias.

Fig. 7 shows a schematic perspective view of the right ear clip speaker of Figs. 1-5 after engagement with the left speaker, showing another spring biased fastener pressed in against spring bias.

Fig. 8 shows a schematic representation showing the locking engagement of the left and right ear clip speakers.

Figs. 9 and 10 show exploded front and rear perspective views of the right ear clip speaker of Figs. 1-5.

Figs. 11 and 12 show exploded front and rear perspective views of the left ear clip speaker of Figs. 1-5.

## 5 DETAILED DESCRIPTION OF THE INVENTION

Turning to the drawings of Figs. 1-7, a left ear clip speaker **10** and a right ear clip speaker **12** are shown, each having their own conventional flexible ear hook **14** and conventional padding **16**. Each has a respective housing **18, 20** that houses conventional speaker electronics, perhaps within a sub-housing (not shown). The padding **16** is secured to an inner face of the respective housing **18, 20**. The outer convex faces **22, 24** of the housings **18, 20** are convex in configuration and each has a complementary one of spring biased fasteners **26, 28** and a complementary one of the fixed fasteners **30, 32**. Conventional audio cord or wire **34** extends from each speaker with a conventional terminal **36** configured to be inserted into a conventional audio port (not shown) to enable playback of audio signals, after being transformed into sounds by the speaker electronics, through the ear clip speakers **10, 12**.

The ear clip speakers **10, 12** may be locked together by engaging the spring biased fasteners **26, 28** with the fixed fasteners **30, 32**. This may be accomplished by aligning the spring biased fastener **26** and fixed fastener **30** of the left speaker **10** with their counterpart fasteners **28, 32** of the right speaker **12**, pressing the outer convex faces **22, 24** toward each other against the spring bias of the spring biased fasteners **26, 28** while maintaining

the alignment, and, after pressing in as far as possible, twisting the outer convex faces **22**, **24** relative to each other in one direction such as clockwise so as to interlock the fasteners **26**, **28**, **30**, **32**.

The shape of the edges of the spring biased fasteners **26**, **28** conform to the shape of the edges of the fixed fasteners **30**, **32**. Fasteners **26**, **32** preferably have corners **38**. During twisting, the corners **38** of fixed fastener **32** are moved behind the underside of the fixed fastener **30** into a locking position while the spring biased fasteners **26**, **28** remain in a compressed condition. The fixed fastener **30**, which defines a square edge at its opening **40**, may have blocking elements **42** (Fig. 6) that block the corners **38** of fixed fastener **32** and thereby block rotation beyond a quarter turn. These blocking elements **42** extend from the underside of the convex surface of the fixed fastener **30** in succession along one side adjacent each corner of the square edge. Thus, the sides adjacent to the blocking elements **42** at each corner remain clear.

Further, the spring biased fastener **26** presses against the fixed fastener **32** in a direction opposite to the direction that the spring biased fastener **28** presses against the fixed fastener **30**. Once the left and right speakers **10**, **12** are locked together, the audio cord or wire **34** may be spooled or wrapped around the junction between the left and right speakers **10**, **12** to provide a neat appearance and avoid leaving the audio cord or wire **34** dangling in a loose manner by its full length.

To unlock the speakers **10**, **12** from each other, the reverse order of steps involved in locking them is followed. That is, the sequence of steps for locking involves aligning the complementary fasteners **26**, **28**, **30**, **32**, pressing the outer convex faces **22**, **24** of the

housings **18, 20** toward each other against spring bias as far as possible and then twisting the housings **18, 20** in one direction relative to each other. The sequence of steps for unlocking involves twisting the housings **18, 20** in a direction reverse to the one direction relative to each other, allowing the spring bias to push the outer convex faces **22, 24** out of engagement and away from each other and then separating the speakers **10, 12** from each other. If the audio cord or wire **34** had been spooled when the speakers **10, 12** were locked together, then unlocking the speakers **10, 12** from each other and separating them still provides the user with the benefit of having the audio cord or wire **34** in the wrapped condition if held in that position immediately upon separation of the speakers **10, 12**.

For ease in understanding, Fig. 1 shows a perspective view of the pair of speakers **10, 12** prior to engagement, with the audio cord or wire **34** shown dangling. Figs. 2-4 illustrate the locking procedure in succession, i.e., alignment, engagement and twisting rotation.

Fig. 5 shows spooling the audio cord or wire **34** about the junction where the convex faces **22**, **24** are interlocked by the complementary fasteners. The dimension of the junction is smaller than the dimension of the padding **16** and the largest dimension of each of the speakers. Such a configuration enables spooling.

Figs. 6 and 7 show representative internal views of the speakers **10, 12** to illustrate the spring biasing action using springs **44**. Fig. 8 represents the manner in which the fasteners **30, 32** interlock under the spring bias at fasteners **26, 28**. The view shows the top of fixed fastener **32** after it has protruded through the opening **40** in the fixed fastener

30 and is twisted relative to the fixed fastener 30. Blocking elements 40 only permit a quarter turn.

By providing the two central fasteners 26, 32 with corners 38, the fixed one of the two central fasteners 32 will have its corners 38 lodge or wedge behind the underside of the outer one of the fixed fasteners 30 due to spring bias exerted in opposite directions by the central fastener 26 against the central fastener 32 and by the outer fastener 28 against the outer fastener 30. The thickness of the fixed fasteners 30, 32 should be such as to enable the fixed fastener 32 to clear the thickness of the fixed fastener 30 when the spring biased fasteners 26, 28 are at most in the fully compressed conditions so as to enable relative twisting thereafter to effect the locking.

As should be evident from the drawings, the outward face of the spring biased fasteners 26, 28 each define a portion of a contour of the convex configuration of the respective housing while in a fully extended position, i.e, with the spring biased fasteners in a relaxed condition. When in a fully retracted position, however, each outward face leaves a recess in the convex configuration, i.e., with the spring biased fasteners in a compressed condition.

Figs. 9 and 10 show the assembly of the right ear clip speaker and Figs. 11 and 12 show the assembly of the left ear clip speaker. Figs. 9-10 show a logo piece 50, a floating ring 52, a spring 44A, a cover 54, an ear hook 14A, a speaker driver 56, a speaker ring 58A and the padding 16 (foam ear pad). Figs. 11-12 show the padding 16 (foam ear pad), speaker ring 58B, ear hook 14B, chassis 60, cover 62, spring 44B, and logo piece 64. The logo pieces 50, 66 may have an advertising logo or other indicia on them.

To avoid duplication, Fig. 10 only depicts the opposite side of those components of Fig. 9 that are not evident from Fig. 11 for the same components. Fig. 12 also only shows the opposite side of those components whose opposite side is not depicted elsewhere. The left and right ear clip speakers' ear hooks **14A**, **14B**, and the left and right ear clip speakers' speaker rings **58A**, **58B** mirror each other. The padding **16** and the speaker drivers **56** are the same construction for the left and right ear clip speakers.

For ease in understanding the terminology of the application, the logo piece **64** of Figs. 11 and 12 is part of the spring biased fastener **26** of Fig. 6. The floating ring **52** of Figs. 9 and 10 is part of the spring biased fastener **28** of Fig. 7. The logo piece **50** of Figs. 9 and 10 is part of the fixed fastener **32** of Fig. 7. The cover **62** of Figs. 11 and 12 includes the fixed fastener **30** of Fig. 6.

While the foregoing description and drawings represent the preferred embodiments of the present invention, it will be understood that various changes and modifications may be made without departing from the spirit and scope of the present invention.